

This review is not comprehensive. Be sure to study your notes, homework assignments and old tests as well.

1. Which of the following sets of ordered pairs would *not* be considered a function?

(1) $\{(-4, 1), (-1, 7), (3, 8), (5, 3)\}$

(2) $\{(-2, 5), (6, 1), (-2, 10), (6, -1)\}$

(3) $\{(2, 8), (4, 10), (6, 8), (8, 10)\}$

(4) $\{(-3, 5), (3, -5), (-6, 7), (6, -7)\}$

x-values do not repeat in a function.

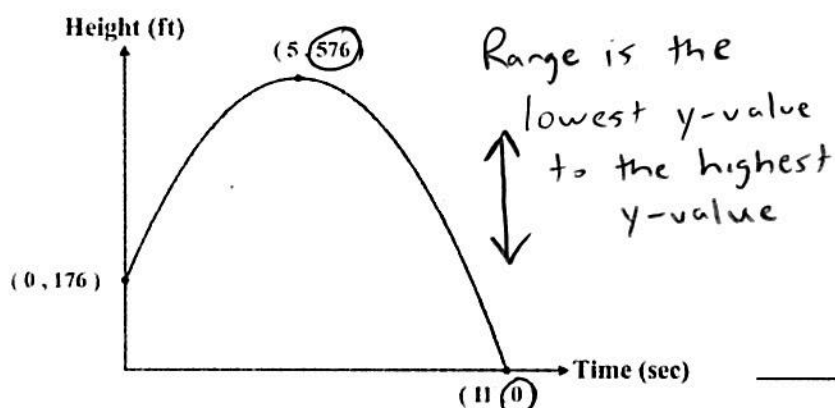
2. In the following graph, the height of an object, in feet, is given as a function of time in seconds. Which of the following would be the range of this function?

(1) $[0, 5]$

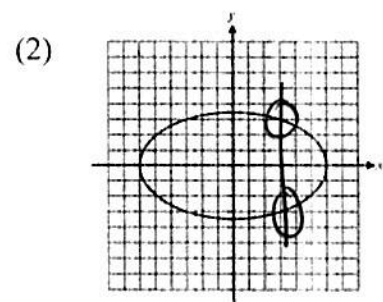
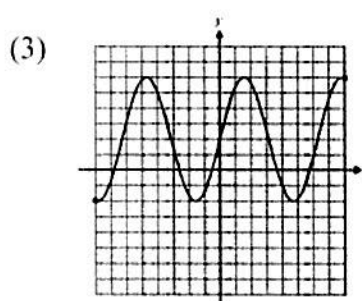
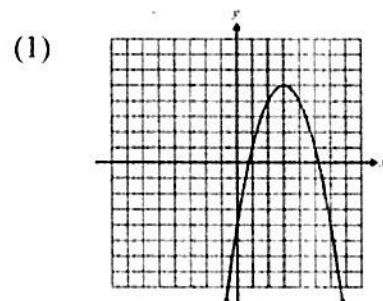
(2) $[0, 11]$

(3) $[176, 576]$

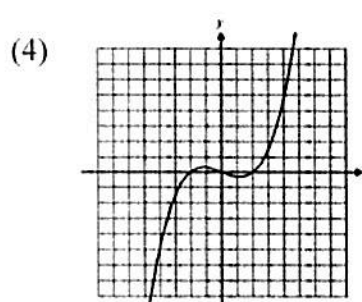
(4) $[0, 576]$



3. In which of the following four graphs is the output *not* a function of the input?



Does Not Pass V.L.T.



4. If $f(x) = -\frac{1}{2}x + 6$, then which of the following values solves the equation $f(x) = 10$?

(1) 1

(2) -4

(3) -8

(4) 11

$$\begin{array}{r} 10 = -\frac{1}{2}x + 6 \\ -6 \quad -6 \\ \hline 4 = -\frac{1}{2}x \\ \frac{4}{-\frac{1}{2}} = \frac{-\frac{1}{2}x}{-\frac{1}{2}} \quad x = -8 \end{array}$$

5. The function f is defined by the formula $f(x) = x^2 + 2$ and the function g is defined by the graph shown below. Which of the following is the value of $f(g(2))$?

(1) 18

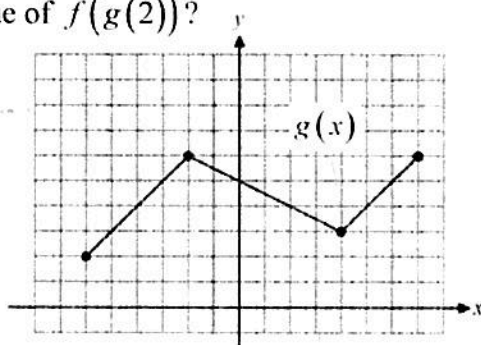
(2) 14

(3) 5

(4) 9

$$g(2) = 4$$

$$f(4) = 4^2 + 2 = 18$$



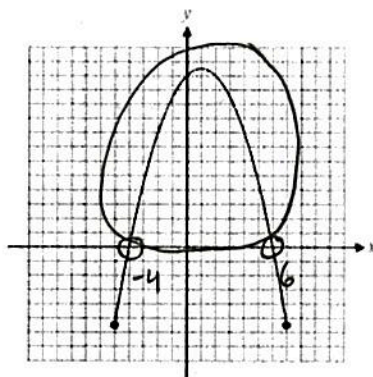
6. Given the function $f(x)$ shown in the graph below, for which of the following intervals is $f(x) > 0$?

(1) (0, 8)

(2) [0, 8]

(3) (-4, 6)

(4) [-4, 6]



Above
the
x-axis

7. Which of the following values of x would *not* be in the domain of the function $f(x) = \frac{x-7}{2x+5}$?

(1) 7

(3) -5

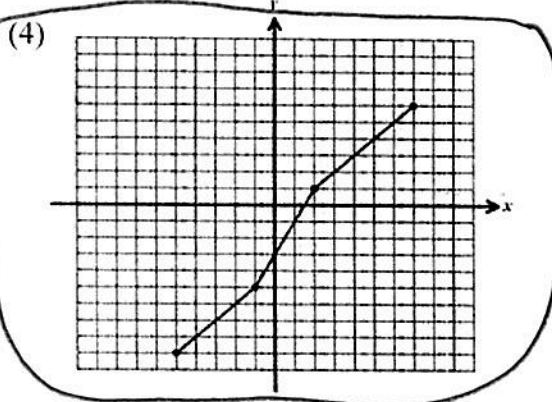
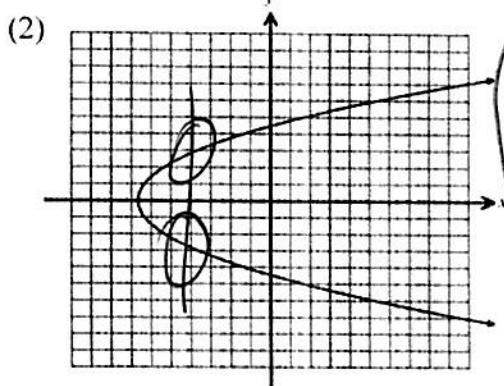
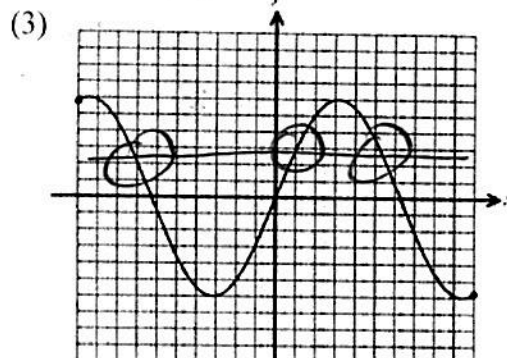
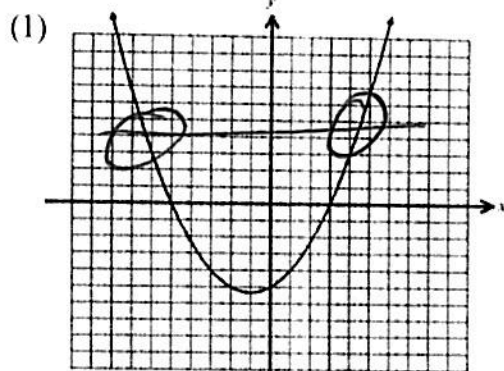
(2) $-2\frac{1}{2}$

(4) -7

$$\begin{array}{r} 2x + 5 \neq 0 \\ -5 \quad -5 \\ \hline 2x \neq -5 \\ \frac{2x}{2} \neq \frac{-5}{2} \\ x \neq -\frac{5}{2} \\ x \neq -2\frac{1}{2} \end{array}$$

8. Which of the following graphs represents a one-to-one function?

Must Pass
V.L.T. and H.L.T



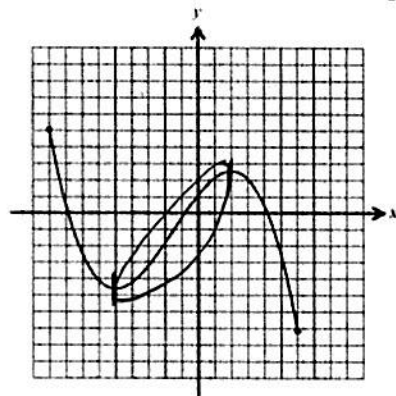
9. Given the function shown below, over which of the following intervals is the function always increasing?

(1) $0 < x < 5$

(2) $-5 < x < 2$

(3) $-1 < x < 4$

(4) $-9 < x < -5$



going up
from left
to right

10. A circle whose center is at $(5, -3)$ and which passes through the point $(7, -8)$ has a radius equal to?

(1) 5

(3) $\sqrt{44}$

(2) $\sqrt{29}$

(4) 8

$$\begin{aligned} r &= \sqrt{(5-7)^2 + (-3-(-8))^2} \\ &= \sqrt{(-2)^2 + (5)^2} \\ &= \sqrt{4 + 25} \\ &= \sqrt{29} \end{aligned}$$

Distance
between
points

11. Given the function $y = f(x)$ shown graphed below, answer the following questions.

- (a) State the value of $f(2)$. What is y when $x = 2$?

$$f(2) = 4$$

- (b) How many values solve the equation $f(x) = 5$?

Explain how you arrived at your answer.

How many times does the function have a y -value of 5?

3

- (c) On the interval $0 < x < 4$ is the function increasing or decreasing? How can you tell?

Decreasing because it is going down from left to right.

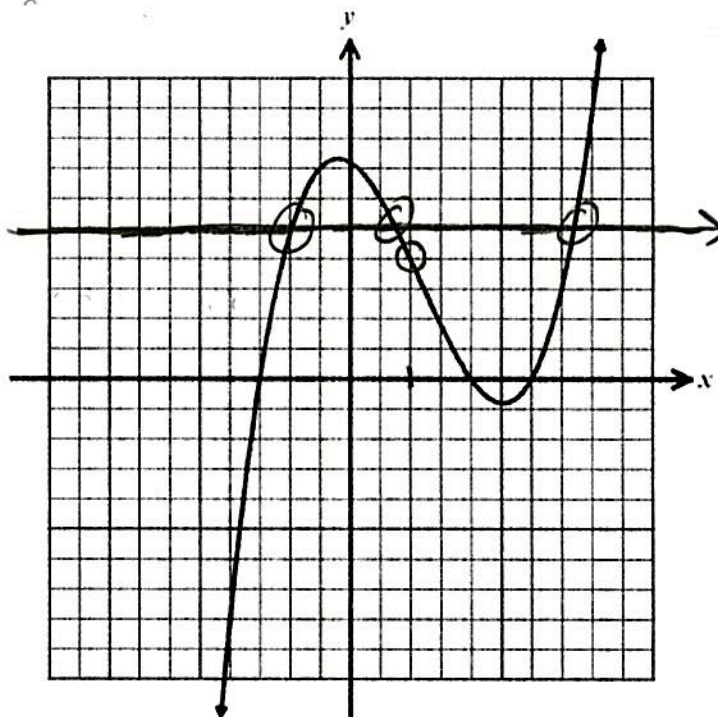
- (d) If a second function is defined by the formula $g(x) = \frac{2x-7}{3}$, then what is the value of $g(f(1))$? Show the work that leads to your answer.

$$f(1) = 6$$

from the graph

$$g(6) = \frac{2(6)-7}{3} = \frac{12-7}{3} = \frac{5}{3}$$

$$g(f(1)) = \frac{5}{3}$$



12. For the function $f(x) = \sqrt{x-9}$, either $x=0$ or $x=45$ is a member of its domain. Determine which and explain how you arrived at your answer.

$$x-9 \geq 0$$

$$+9 \quad +9$$

$$x \geq 9$$

x is greater than or equal to 9, so $x=0$ is not in the domain but $x=45$ is.

13. Is the function $y = |x - 6| + 2$ a one-to-one function? Explain your answer.

Graph it on the calculator
 $y = |x - 6| + 2$ does not pass the
 horizontal line test therefore it
 is not one to one.

14. The temperature of a room is measured over the span of the day with selected values given in the table below.

Time (hrs)	0.5	1.5	2.0	4.0	5.5	7.25	8.0	9.5	10.0
Temperature ($^{\circ}\text{F}$)	64	66	71	78	81	79	71	68	66

Based on this table, explain why temperature can be considered a function of time but time cannot be considered a function of temperature.

Time does not repeat values but temperature does.

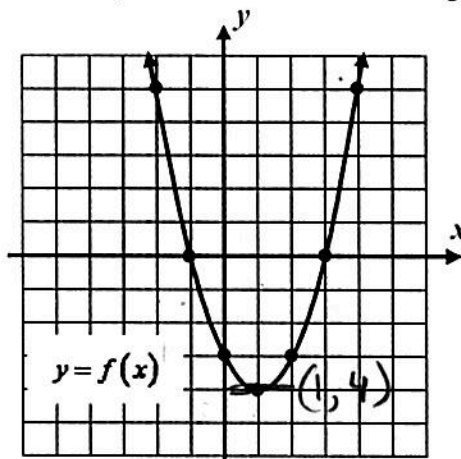
15. What are the coordinates of the center of the circle whose equation is $x^2 + 4x + y^2 - 10y + 12 = 0$?

16. Determine the center and radius of the circle whose equation is $x^2 + 6x + y^2 - 14y = 42$ on back page

17. The function $f(x) = x^2 - 2x - 3$ is graphed on the grid below. Express the domain and range in interval notation.

$D: (-\infty, \infty)$ (left to right)

$R: [-4, \infty)$ (bottom to top)



18. Which of the following values of x would not be in the domain of the function $y = \sqrt{x+4}$? Explain your answer.

(1) $x = 0$

(3) $x = -3$

$$x+4 \geq 0$$

$$x \geq -4$$

(2) $x = 5$

(4) $x = -8$

19. A function is given by the set of ordered pairs $\{(2, 5), (4, 9), (6, 13), (8, 17)\}$. Write its domain and range in roster form.

Domain: $\{2, 4, 6, 8\}$

Range: $\{5, 9, 13, 17\}$

20. The function $h(x) = x^2 + 5$ maps the domain given by the set $\{-2, -1, 0, 1, 2\}$. Which of the following sets represents the range of $h(x)$? Plug in the values

(1) $\{0, 6, 10, 12\}$

(3) $\{5, 6, 9\}$

$$h(-2) = (-2)^2 + 5 = 9$$

$$h(-1) = (-1)^2 + 5 = 6$$

$$h(0) = (0)^2 + 5 = 5$$

$$h(1) = (1)^2 + 5 = 6$$

$$h(2) = (2)^2 + 5 = 9$$

(2) $\{5, 6, 7\}$

(4) $\{1, 4, 5, 6, 9\}$

21. Which of the following values of x would *not* be in the domain of the function defined by $f(x) = \frac{x-2}{x+3}$?

(1) $x = -3$

(3) $x = 3$

$$x+3 \neq 0$$

$$x \neq -3$$

(2) $x = 2$

(4) $x = -2$

22. Determine any values of x that do not lie in the domain of the function $f(x) = \frac{3x+2}{2x-10}$. Justify your response.

$$\begin{array}{r} 2x-10 \neq 0 \\ +10 \quad +10 \\ \hline 2x \neq \frac{10}{2} \\ \frac{2x}{2} \end{array}$$

$$x \neq 5$$

23. Which of the following values of x does lie in the domain of the function defined by $g(x) = \sqrt{2x-7}$?

(1) $x = 0$

(3) $x = 3$

$$\begin{array}{r} 2x-7 \geq 0 \\ +7 \quad +7 \\ \hline 2x \geq 7 \\ \frac{2x}{2} \end{array}$$

$$x \geq \frac{7}{2}$$

(2) $x = 2$

(4) $x = 5$

$$\frac{2x}{2} \geq \frac{7}{2}$$

$$x \geq 3.5$$

24. Which of the following would represent the domain of the function $y = \sqrt{6-2x}$?

(1) $\{x : x > 3\}$

(3) $\{x : x \leq 3\}$

$$6-2x \geq 0$$

$$\begin{array}{r} +2x \quad +2x \\ \hline 6 \geq 2x \\ \frac{6}{2} \end{array}$$

$$\frac{6}{2} \geq \frac{2x}{2}$$

$$3 \geq x$$

(2) $\{x : x < 3\}$

(4) $\{x : x \geq 3\}$

25. A child starts a piggy bank with \$2. Each day, the child receives 25 cents at the end of the day and puts it in the bank. If A represents the amount of money and d stands for the number of days then $A(d) = 2 + 0.25d$ gives the amount of money in the bank as a function of days (think about this formula).

(a) Evaluate $A(1)$, $A(7)$, and $A(30)$.

$$A(1) = 2 + .25(1) \quad A(7) = 2 + .25(7) \quad A(30) = 2 + .25(30)$$

$$\boxed{A(1) = 2.25} \quad \boxed{A(7) = 3.75} \quad \boxed{A(30) = 9.50}$$

(c) Explain why the domain does not contain the value $d = 2.5$.

The money is added on a daily basis therefore "d" can be whole numbers only.

(b) For what value of d will $A(d) = \$10.50$.

$$10.50 = 2 + .25d$$

$$\frac{8.50}{.25} = \frac{.25d}{.25} \quad \boxed{d = 34}$$

(d) Explain why the range does not include the value $A = \$3.10$.

25¢ is added everyday. If we start at \$2 and money at 25¢ increments we will get \$3 then \$3.25

26. Write $\frac{x^3 - 10x^2 + 11x + 70}{x+2}$ in the form $q(x) + \frac{r}{x+2}$, where $q(x)$ is a polynomial and r is a constant.

27. What is the domain of $\frac{2}{\sqrt{x^2 - x - 30}}$?

28. Is $(x+4)$ a factor of $x^4 - 3x^3 + 25x^2 - 10$. Explain your answer.

29. Solve $\frac{x+1}{x-3} \geq 2$ and express your answer in set builder notation.

30. Solve $x^2 + 40 = -6x$ by completing the square.

31. Solve for all zeros: $P(x) = x^5 + 2x^3 - 24x$

32. Determine the equation of the cubic that has zeros of -4, 2, and 5 and also passes through the point (6, 20).

$$p(x) = a(x+4)(x-2)(x-5)$$

$$20 = a(6+4)(6-2)(6-5)$$

$$20 = a(10)(4)(1)$$

$$\frac{20}{-40} = \frac{40a}{-40}$$

$$\frac{1}{2} = a$$

$$\boxed{p(x) = \frac{1}{2}(x+4)(x-2)(x-5)}$$

At the end.

$$15) \quad x^2 + 4x + \boxed{4} + y^2 - 10y + \boxed{25} = -12 + \boxed{4} + \boxed{25}$$

$$\frac{4}{2} = 2$$

$$2^2 = 4$$

$$-\frac{10}{2} = -5$$

$$(-5)^2 = 25$$

$$(x+2)^2 + (y-5)^2 = 17$$

$$\boxed{\begin{array}{l} \text{Center} = (-2, 5) \\ \text{radius} = \sqrt{17} \end{array}}$$

$$16) \quad x^2 + 6x + \boxed{9} + y^2 - 14y + \boxed{49} = 42 + \boxed{9} + \boxed{49}$$

$$\frac{6}{2} = 3$$

$$3^2 = 9$$

$$-\frac{14}{2} = -7$$

$$(-7)^2 = 49$$

$$(x+3)^2 + (y-7)^2 = 100$$

$$\boxed{\text{Center} = (-3, 7) \quad \text{radius} = \sqrt{100} = 10}$$

26)

$$\begin{array}{r} x^2 - 12x + 35 + \frac{0}{x+2} \\ x+2 \overline{) x^3 - 10x^2 + 11x + 70} \\ \underline{-(x^3 + 2x^2)} \\ -12x^2 + 11x \\ \underline{-(-12x^2 - 24x)} \\ 35x + 70 \\ \underline{-(35x + 70)} \\ 0 \end{array}$$

$$\boxed{x^2 - 12x + 35 + \frac{0}{x+2}}$$

Alt:

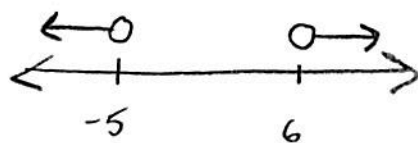
$$\begin{array}{r|rrrr} -2 & 1 & -10 & 11 & 70 \\ & & -2 & 24 & -70 \\ \hline & 1 & -12 & 35 & 0 \\ & x^2 & -12x & +35 & + \frac{0}{x+2} \end{array}$$

$$27) \frac{2}{\sqrt{x^2 - x - 30}}$$

$$x^2 - x - 30 \geq 0 \quad \text{GOLI}$$

$$(x-6)(x+5)$$

6 -5



$$\text{SB: } \{x \mid x < -5 \vee 6 < x\}$$

$$\text{Int: } (-\infty, -5) \cup (6, \infty)$$

$$28) \begin{aligned} x+4 &= 0 \\ x &= -4 \\ \text{Plug in} \\ -4 \end{aligned}$$

$$(-4)^4 - 3(-4)^3 + 25(-4)^2 - 10$$

$$= 838 \quad \boxed{(x+4) \text{ is not a factor}}$$

If it was we would have gotten 0 as our result.

$$29) \frac{x+1}{x-3} \geq 2$$

$$\frac{x+1}{x-3} - 2 \geq 0$$

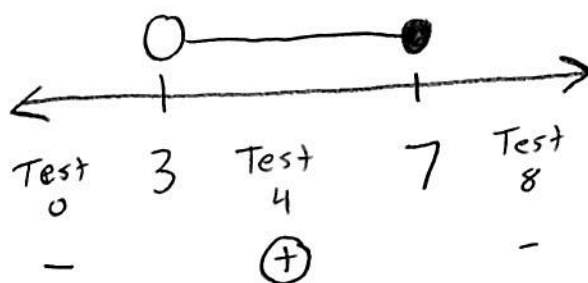
$$\frac{x+1}{x-3} - \frac{2(x-3)}{x-3} \geq 0$$

$$\frac{x+1-2x+6}{x-3} \geq 0$$

$$\frac{-x+7}{x-3} \geq 0 \quad \text{positives}$$

$$\begin{aligned} -x+7 &= 0 \\ 7 &= x \\ \text{closed} \end{aligned}$$

$$\begin{aligned} x-3 &= 0 \\ x &= 3 \\ \text{open} \end{aligned}$$



$$\text{SB: } \{x \mid 3 < x \leq 7\}$$

$$30) \quad x^2 + 6x + \boxed{9} = -40 + \boxed{9}$$

$$\frac{6}{2} = 3$$

$$(x+3)^2 = -31$$

$$3^2 = 9$$

$$x+3 = \pm \sqrt{-31}$$

$$x+3 = \pm i\sqrt{31}$$

$$\begin{matrix} -3 & -3 \end{matrix}$$

$$\boxed{x = -3 \pm i\sqrt{31}}$$

$$31) \quad p(x) = x^5 + 2x^3 - 24x$$

$$x(x^4 + 2x^2 - 24)$$

$$x(x^2 + 6)(x^2 - 4)$$

$$x(x^2 + 6)(x+2)(x-2)$$

$x=0$	$x^2+6=0$ $-6-6$ $x^2=-6$ $x=\pm\sqrt{-6}$ $x=\pm i\sqrt{6}$	$x=-2$	$x=2$
-------	--	--------	-------

$$\boxed{x = 0, -2, 2, \pm i\sqrt{6}}$$

